LDLRAP1 gene

low density lipoprotein receptor adaptor protein 1

Normal Function

The *LDLRAP1* gene (also known as *ARH*) provides instructions for making a protein that helps remove cholesterol from the bloodstream. Cholesterol is a waxy, fat-like substance that is produced in the body and obtained from foods that come from animals. The function of the LDLRAP1 protein is particularly important in the liver, which is the organ responsible for clearing most excess cholesterol from the body.

The LDLRAP1 protein interacts with a protein called a low-density lipoprotein receptor. This type of receptor binds to particles called low-density lipoproteins (LDLs), which are the primary carriers of cholesterol in the blood. The receptors sit on the outer surface of cells, where they pick up low-density lipoproteins circulating in the bloodstream. The LDLRAP1 protein appears to play a critical role in moving these receptors, together with their attached low-density lipoproteins, from the cell surface to the interior of the cell. Once inside the cell, low-density lipoproteins are broken down to release cholesterol. The cholesterol is then used by the cell, stored, or removed from the body.

Health Conditions Related to Genetic Changes

hypercholesterolemia

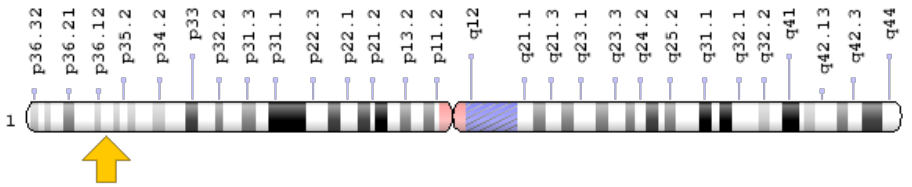
More than 10 mutations in the *LDLRAP1* gene have been shown to cause a form of inherited high cholesterol called autosomal recessive hypercholesterolemia. These mutations lead to the production of an abnormally small, nonfunctional version of the LDLRAP1 protein or prevent cells from making any of this protein. Without the LDLRAP1 protein, low-density lipoprotein receptors are unable to remove low-density lipoproteins from the bloodstream effectively. Although the receptors can still bind normally to low-density lipoproteins, these molecules are not properly transported into cells (particularly liver cells). As a result, many extra low-density lipoproteins remain in the blood.

Because low-density lipoproteins are major carriers of cholesterol in the blood, people with mutations in the *LDLRAP1* gene have very high blood levels of cholesterol. As the excess cholesterol circulates through the bloodstream, it is deposited abnormally in tissues such as the skin, tendons, and arteries that supply blood to the heart (coronary arteries). A buildup of cholesterol in the walls of coronary arteries greatly increases a person's risk of having a heart attack.

Chromosomal Location

Cytogenetic Location: 1p36.11, which is the short (p) arm of chromosome 1 at position 36.11

Molecular Location: base pairs 25,543,580 to 25,590,400 on chromosome 1 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ARH
- ARH_HUMAN
- autosomal recessive hypercholesterolemia protein
- FHCB1
- FHCB2
- LDL receptor adaptor protein
- MGC34705

Additional Information & Resources

Educational Resources

- Molecular Biology of the Cell (fourth edition, 2002): The receptor-mediated endocytosis of LDL https://www.ncbi.nlm.nih.gov/books/NBK26870/?rendertype=figure&id=A2398
- Molecular Cell Biology (fourth edition, 2000): The LDL Receptor Binds and Internalizes Cholesterol-Containing Particles https://www.ncbi.nlm.nih.gov/books/NBK21639/#A4864

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28LDLRAP1%5BTIAB%5D%29+OR+%28%28ARH%5BTIAB%5D%29+OR+%28autosomal+recessive+hypercholesterolemia+protein%5BTIAB%5D%29+OR+%28LDL+receptor+adaptor+protein%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1440+days%22%5Bdp%5D

OMIM

- LOW DENSITY LIPOPROTEIN RECEPTOR ADAPTOR PROTEIN 1
  http://omim.org/entry/605747

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_LDLRAP1.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=LDLRAP1%5Bgene%5D
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=18640
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/26119
- UniProt
  http://www.uniprot.org/uniprot/Q5SW96

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